IN THE CLAIMS:

Claims 1-17 of this application are now pending as follows:

--1. (Currently Amended) A method of optimizing an optical system, comprising the steps of :

optimizing an optical system as a subject of design by changing design parameters in a manner that a value of a first optical property approaches a target value on the basis of a first merit function for optimization in which the target value of the first optical property including at least an aberration is set;

automatically adjusting the first merit function in a manner that a value of a second optical property which is different from the first optical property approaches a desired target value of the second optical property on the basis of a second merit function for optimization in which the target value of the second optical property is set, after the optical system as a subject of design is evaluated while regarding the second optical property as a subject of evaluation; ~~an evaluation result of the optical system on the second optical property, the second optical property having relatively high non-linearity with the design parameters of the optical system compared to the first optical property;~~ and

re-optimizing the optical system, which has been optimized, on the basis of the first merit function automatically adjusted, wherein

each of the first merit function and the second merit function is a sum total of functions represented by $w_i*(f_i-t_i)^2$ of the first optical property or the second optical property (where 'f_i'means an evaluated value of the $_i$th optical property included in the first or the second optical property (i represents an integer greater than or equal to 1); 't_i' means a target value of the $_i$th optical property; 'w_i' means a weight value of the $_i$th optical property; and '*' means multiplication,

in the step of optimizing the optical system, the design parameters are adjusted in a manner that the first merit function takes the minimum, and

in the step of automatically adjusting the first merit function, the target value t_i and the weight value w_i of the first merit function are adjusted in a manner that the second merit function takes the minimum.--

--2. (Currently Amended) A method of optimizing an optical system according to claim 1, further comprising a step of evaluating the optical system as a subject of design on the first optical property prior to the step of optimizing the optical system, wherein in the step of optimizing the optical system, optimization of the optical system is performed on the basis of the first evaluation result an the first merit function.--

--3. (Currently Amended) A method of optimizing an optical system according to claim 1, wherein when the first optical property includes a plurality of optical properties in the first merit function, each of the first optical properties has a weight.--

--4. (Canceled).--

--5. (Original) A method of optimizing an optical system according to claim 1, wherein the second optical property includes a modulation transfer function.--

--6. (Currently Amended) A method of optimizing an optical system according to claim 1, wherein,

in the first merit function, the first optical properties are considered on each of a plurality of sample object points set in different positions,

each of the first optical properties of the plurality of sample object points has a relative weight, and

the automated adjustment of the first merit function includes a process of relatively adjusting the values of the weights.--

--7. (Currently Amended) A method of optimizing an optical system according to claim 6, wherein

the first optical properties on the plurality of sample object points include optical properties for each of two coordinate components on each sample object point, the two coordinate components being orthogonal to each other, and

the automated adjustment of the first merit function includes a process of adjusting the values of the weights for each of the two coordinate components.--

--8. (Currently Amended) A method of optimizing an optical system according to claim 1, wherein

in the first merit function, the first optical properties are considered on each of a plurality of different sample rays from one sample object point,

each of the first optical properties of the plurality of different sample rays has a relative weight, and

the automated adjustment of the first merit function includes a process of relatively adjusting the values of the weights.--

--9. (Currently Amended) A method of optimizing an optical system according to claim 8, wherein

the first optical properties on the plurality of different sample rays include optical properties for each of two coordinate components on each sample ray, the two coordinate components being orthogonal to each other, and

the automated adjustment of the first merit function includes a process of adjusting the values of the weights for each of two coordinate components.--

--10. (Currently Amended) A method of optimizing an optical system according to claim 1, wherein

the second optical properties include a modulation transfer function, the first optical properties include an optical property for controlling a peak position, the optical property contributing to a peak position control of the modulation transfer function, and

the automated adjustment of the first merit function includes a process of adjusting a function on the optical property for controlling the peak position in a manner that the modulation transfer function approaches a desired target value.--

--11. (Original) A method of optimizing an optical system according to claim 10, wherein the function on the optical property for controlling the peak position includes a function for curvature of field on a principal ray.--

--12. (Original) A method of optimizing an optical system according to claim 10, wherein the function on the optical property for controlling the peak position includes a function describing the mean of longitudinal aberrations.--

--13. (Original) A method of optimizing an optical system according to claim 10, wherein the function on the optical property for controlling the peak position includes a function describing the minimum of square spot size.--

--14. (Currently Amended) A method of optimizing an optical system according to claim 1, wherein

in the step of optimizing an optical system, a plurality of local optimal solutions is obtained by performing global optimization,

in the step of automatically adjusting the first merit function, evaluation of each of one or more of optical systems described by the plurality of local optimal solutions is performed on the second optical properties on the basis of a result of the evaluation and then the first merit function is automatically adjusted for each of the one or more of the optical system in a manner that the value of the second optical property approaches a desired target value, and

in the step of re-performing optimization, each of the one or more of the optical systems is re-optimized.--

--15. (Currently Amended) An apparatus for optimizing an optical system, comprising:

optimization means for optimizing an optical system as a subject of design by changing design parameters in a manner that a value of a first optical property approaches a target value, on the basis of a first merit function for optimization in which a target value of the first optical property including at least an aberration is set;

adjusting means for automatically adjusting the first merit function for optimization in a manner that a value of second optical property which is different from the first optical property approaches a desired target value of the second optical property on the basis of a second merit function for optimization in which the target value of the second optical property is set, after the optical system as a subject of design is evaluated while regarding the second optical property as a subject of evaluation; ~~an evaluation result of the optical system on the second optical property, the second optical property having relatively high non-linearity with the design parameters of the optical system compared to the first optical property;~~ and

control means for controlling the optimization means in a manner that re-optimization is performed on the optical system which has been optimized on the basis of the first merit function for optimization automatically adjusted, wherein

each of the first merit function and the second merit function is a sum total of functions represented by $w_i*(f_i-t_i)^2$ of the first optical property or the second optical property (where 'f_i' means an evaluated value of the $_i$th optical property included in the first or the second optical property (i represents an integer greater than or equal to 1); 't_i' means a target value of the $_i$th optical property; 'w_i' means a weight value of the $_i$th optical property; and '*' means multiplication,

in the optimization means, the design parameters are adjusted in a manner that the first merit function takes the minimum, and

in the adjusting means, the target value t_i and the weight value w_i of the first merit function are adjusted in a manner that the second merit function takes the minimum.--

--16. (Currently Amended) An apparatus for optimizing an optical system according to claim 15, further comprising first evaluation means for evaluating the optical system as a subject of design on the first optical property prior to the optimization by the optimization means, wherein

the optimization means performs optimization of the optical system on the basis of the first evaluation result and the first merit function for optimization.--

17. (Currently Amended) A recording medium, wherein an optimization program for an optical system executable in a computer is recorded, the optimization program comprising the steps of:

optimizing the optical system as a subject of design by changing design parameters in a manner that a value of a first optical property approaches a target value on the basis of a first merit

function for optimization in which the target value for the first optical property including at least an aberration is set;

automatically adjusting the first merit function for optimization in a manner that a value of second optical property which is different from the first optical property approaches a desired target value of the second optical property on the basis of a second merit function for optimization in which the target value of the second optical property is set, after the optical system as a subject of design is evaluated while regarding the second optical property as a subject of evaluation; ~~an evaluation result of the optical system on the second optical property, the second optical property having relatively high non-linearity with the design parameters of the optical system compared to the first optical property;~~ and

re-optimizing the optical system, which has been optimized, on the basis of the first merit function automatically adjusted, wherein

each of the first merit function and the second merit function is a sum total of functions represented by $w_i*(f_i-t_i)^2$ of the first optical property or the second optical property (where 'f_1' means an evaluated value of the $_i$th optical property included in the first or the second optical property (i represents an integer greater than or equal to 1): 't_i'means a target value of the $_i$th optical property; 'w_i' means a weight value of the $_i$th optical property; and '*' means multiplication,

in the step of optimizing the optical system, the design parameters are adjusted in a manner that the first merit function takes the minimum, and

in the step of automatically adjusting the first merit function, the target value t_i and the weight value w_i of the first merit function are adjusted in a manner that the second merit function takes minimum.--

--18. (Currently Amended) A recording medium according to claim 17, in which the optimization program is recorded, the recording medium further comprising a step of evaluating the optical system as a subject of design on the first optical properties prior to the step of optimizing the optical system, wherein

the optimization of the optical system is performed on the basis of the first evaluation result and the first merit function in the step of optimizing the optical system.--